



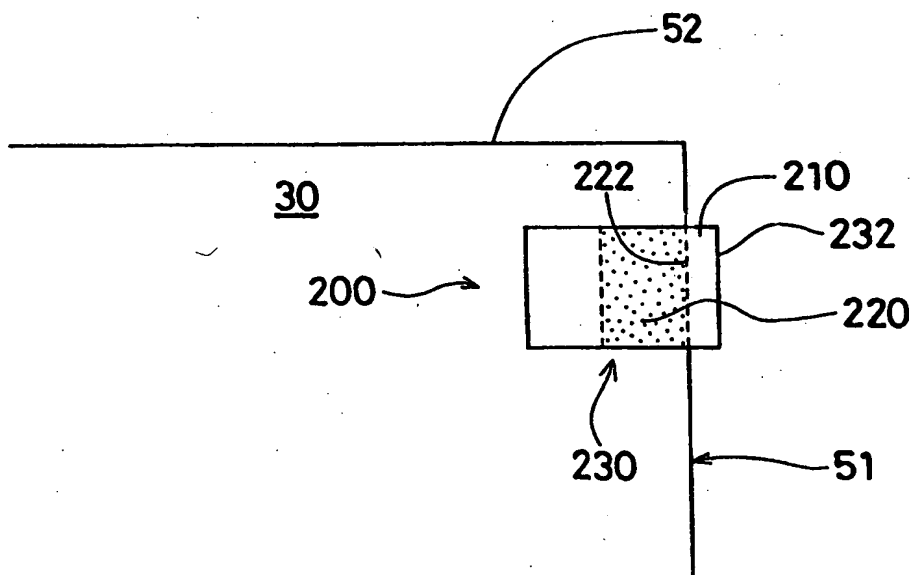
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: DISPOSABLE ABSORBENT ARTICLES HAVING INTERNAL MECHANICAL FASTENERS

## (57) Abstract

Disclosed is an absorbent article having a periphery, a longitudinal center line and a lateral centerline, comprising: (a) a containment assembly having a rear waist region, a crotch region, a front waist region, a body facing surface and a garment facing surface opposite to the body facing surface, the containment assembly comprising a topsheet, a backsheet joined to the topsheet, an absorbent core positioned between the topsheet and the backsheet; (b) a pair of rear ear panels extending laterally outwardly from the longitudinal edges of the containment assembly in the rear waist region; (c) at least one pair of fasteners secured to the rear ear panels, the fasteners being free from adhesive; and (d) a landing region located on the outer facing surface of the article in the front waist region of the article, the fasteners being secured to the landing region when the article is worn.



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## DISPOSABLE ABSORBENT ARTICLES HAVING INTERNAL MECHANICAL FASTENERS

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### FIELD

The present invention relates generally to disposable absorbent articles such as disposable diapers, and more particularly to disposable absorbent articles having internal mechanical fasteners.

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### BACKGROUND

Infants and other incontinent individuals wear disposable absorbent articles such as diapers to receive and contain urine and other body exudates. Absorbent articles function both to contain the discharged materials and to isolate these materials from the body of the wearer and from the wearer's garments and bed clothing. Disposable absorbent articles having many different basic designs are known in the art, including tape type diapers in which the rear portion of the diaper is attached to the front portion of the diaper on each side of the wearer, typically by means of an adhesive fastening tape, and pull-on type diapers which allow the wearer to pull the absorbent article on as pants and which do not require any of the fastening steps of the tape type diapers.

The fastening systems that are conventionally used for tape type diapers include tape or adhesive members fixed in the rear waist region of the diaper and a landing zone on the front waist region of the diaper. These conventional diapers are typically fitted to the wearer by first placing a portion of the diaper under the wearer (generally, the back portion of the diaper is placed under the buttocks and rear waist of the wearer) and then pulling the remainder of the diaper through the wearer's legs. The rear portion of the diaper is then attached to the front portion on each side of the wearer by securing the fastening tapes to the landing member.

It is also known that the exterior of disposable diapers can be covered with a flexible, liquid and vapor impervious sheet to prevent any absorbed liquid from passing through the diaper and soiling adjacent articles such as clothing, bedding and the like. These outer covers, generally referred to as backsheets, are often constructed from fluid impervious films such as polyethylene. Recent disposable diapers may also use cloth-like backsheets to provide a visual breathability and an improved natural look and/or impression. A typical structure of such a cloth-like backsheet comprises a nonwoven web joined to the outer-facing surface of a microporous thin plastic to form a laminate.

Whatever type of backsheet is used for a tape-type diaper, the backsheet is subject to being torn by the fastening tapes if the consumer accidentally sticks the tape to the backsheet, for example, as may occur during application or changing of the diaper.

In addition, during the manufacture of tape-type diapers, it can sometimes happen that the adhesive portion of the tape, which is sticky, and the mated release portion of the tape, which is not sticky, are not correctly matched when the tape is folded upon itself to prevent the sticky portion from being exposed when the diaper is being stored. Such a mismatch leaves a portion of the sticky surface of the tape exposed, which then tends to stick to the backsheet as the diaper products are folded and packaged for shipment. Thus, when the consumer opens or unfolds the diaper product just prior to use, the tape tears the backsheet. From the consumer's point of view, this is highly frustrating and undesirable.

In addition, the conventional fastening tapes may be somewhat inconvenient for caregivers to use, because it is necessary to remove or pull the tape away from its release surface in order to expose the adhesive such that it can be fastened on the landing zone. For the same reason, re-fastening of the tape may be difficult. This is particularly true for persons who may lack a certain degree of hand strength, e.g., persons with arthritis or persons who are ill.

Thus, there remains a desire to provide a convenient, easy-to-use fastening system for diapers in which accidental tearing of the backsheet is avoided. There further remains a desire to avoid accidental sticking during manufacture. None of the existing art provides all of the advantages and benefits of the present invention.

### **SUMMARY**

The present invention relates to an absorbent article having a periphery, a longitudinal center line and a lateral centerline, comprising; (a) a containment assembly having a rear waist region, a crotch region, a front waist region, a body facing surface and a garment facing surface opposite to the body facing surface, the containment assembly comprising a topsheet, a backsheet joined to the topsheet, an absorbent core positioned between the topsheet and the backsheet; (b) a pair of rear ear panels extending laterally outwardly from the longitudinal edges of the containment assembly in the rear waist region; (c) at least one pair of fasteners secured to the rear ear panels, the fasteners being free from adhesive; and (d) a landing region located on the outer facing surface of the article in the front waist region of the article, the fasteners being secured to the landing region when the article is worn.

These and other features, aspects, and advantages of the invention will become evident to those skilled in the art from a reading of the present disclosure.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description of preferred embodiments taken in conjunction with the accompanying drawings in which:

Fig. 1 is a plan view of a preferred embodiment of a disposable diaper of the present invention having portions cut away to reveal underlying structure, the inner (body facing) surface of the diaper facing the viewer;

Figs. 2a-c are enlarged partial views of a portion of a conventional disposable diaper;

Figs. 3a-b are enlarged partial views of the preferred embodiment of the present invention as shown in Fig. 1; and

Figs. 4a-o show portions of other preferred embodiments of the present invention.

### **DETAILED DESCRIPTION**

The present invention relates to a disposable absorbent article. As used herein, the term "absorbent article" refers to devices which absorb and contain

body exudates, and, more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. The term "disposable" is used herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). A "unitary" absorbent article refers to absorbent articles which are formed of separate parts united together to form a coordinated entity so that they do not require separate manipulative parts like a separate holder and liner. A preferred embodiment of an absorbent article of the present invention is the unitary disposable absorbent article, diaper 20, shown in Fig. 1. As used herein, the term "diaper" refers to an absorbent article generally worn by infants and incontinent persons that is worn about the lower torso of the wearer. It should be understood, however, that the present invention is also applicable to other absorbent articles such as incontinence briefs, incontinence undergarments, diaper holders and liners, feminine hygiene garments, training pants, and the like.

Fig. 1 is a plan view of the diaper 20 in its flat-out, uncontracted state (i.e., with elastic induced contraction pulled out) with portions of the structure being cut-away to more clearly show the construction of the diaper 20 and with the portion of the diaper 20 which faces the wearer, the inner surface 40, facing the viewer. As shown in Fig. 1, the diaper 20 preferably comprises a containment assembly 22 comprising a liquid pervious topsheet 24; a liquid impervious backsheet 26 joined to the topsheet; and an absorbent core 28 positioned between the topsheet 24 and the backsheet 26. The absorbent core 28 has a pair of opposing longitudinal edges 60. The backsheet 26 prevents the exudates absorbed and contained in the absorbent core 28 from wetting articles which contact the diaper 20 such as bed sheet and undergarments. The diaper preferably further comprises at least rear ear panels 30, and also comprises front ear panels 31 and barrier leg cuffs 32. The fastening system 36 preferably comprises one or more pairs of securement members 37 and a landing member 38, as will be explained in greater detail below with reference to Fig. 3. Waist elastics (not shown) may further be provided.

The diaper 20 has an inner surface 40 (facing the viewer in Fig. 1), an outer surface 42 opposed to the inner surface 40, a rear waist region 44, a front

waist region 46 opposed to the rear waist region 44, a crotch region 48 positioned between the rear waist region 44 and the front waist region 46, and a periphery which is defined by the outer perimeter or edges of the diaper 20 in which the side edges are designated 50 and the end edges are designated 52.

5 The inner surface 40 of the diaper 20 comprises that portion of the diaper 20 which is positioned adjacent to the wearer's body during use (i.e., the inner surface 40 generally is formed by at least a portion of the topsheet 24 and other components joined to the topsheet 24). The outer surface 42 comprises that portion of the diaper 20 which is positioned away from the wearer's body (i.e., 10 the outer surface 42 is generally formed by at least a portion of the backsheet 26 and other components joined to the backsheet 26). As used herein, the term "joined" encompasses configurations whereby an element is directly secured to the other element by affixing the element directly to the other element, and configurations whereby the element is indirectly secured to the other element by 15 affixing the element to intermediate member(s) which in turn are affixed to the other element. The rear waist region 44 and the front waist region 46 extend from the end edges 52 of the periphery to the crotch region 48.

The diaper 20 also has two centerlines, a longitudinal centerline 100 and a transverse centerline 110. The term "longitudinal", as used herein, refers to a 20 line, axis, or direction in the plane of the diaper 20 that is generally aligned with (e.g. approximately parallel with) a vertical plane which bisects a standing wearer into left and right halves when the diaper 20 is worn. The term "transverse", as used herein, are interchangeable and refer to a line, axis or direction which lies within the plane of the diaper that is generally perpendicular to the longitudinal 25 direction (which divides the wearer into front and back body halves).

The topsheet 24 and the backsheet 26 have length and width dimensions generally larger than those of the absorbent core 28. The topsheet 24 and the backsheet 26 extend beyond the edges of the absorbent core 28 to thereby form the periphery of the diaper 20. While the topsheet 24, the backsheet 26, and the 30 absorbent core 28 may be assembled in a variety of well known configurations, exemplary containment assembly configurations are described generally in U.S. Patent 3,860,003 entitled "Contractible Side Portions for Disposable Diaper" which issued to Kenneth B. Buell on January 14, 1975; and U.S. Patent 5,151,092 entitled "Absorbent Article With Dynamic Elastic Waist Feature Having

A Predisposed Resilient Flexural Hinge" which issued to Kenneth B. Buell et al., on September 29, 1992.

The absorbent core 28 may be any absorbent member which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquids such as urine and other certain body exudates. As shown in Figure 1, the absorbent core 28 has an outer-facing (or garment-facing) side, a body-facing side, a pair of side edges, and a pair of waist edges. The absorbent core 28 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, hourglass, "T"-shaped, asymmetric, etc.) and from a wide variety of liquid-absorbent materials commonly used in disposable diapers and other absorbent articles such as comminuted wood pulp which is generally referred to as airlaid. Examples of other suitable absorbent materials include creped cellulose wadding; meltblown polymers including coform; chemically stiffened, modified or cross-linked cellulosic fibers; tissue including tissue wraps and tissue laminates; absorbent foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any equivalent material or combinations of materials.

The configuration and construction of the absorbent core 28 may vary (e.g., the absorbent core may have varying caliper zones, a hydrophilic gradient, a superabsorbent gradient, or lower average density and lower average basis weight acquisition zones; or may comprise one or more layers or structures). Further, the size and absorbent capacity of the absorbent core 28 may also be varied to accommodate wearers ranging from infants through adults. However, the total absorbent capacity of the absorbent core 28 should be compatible with the design loading and the intended use of the diaper 20.

The topsheet 24 is preferably positioned adjacent the inner surface of the absorbent core 28 and is preferably joined thereto and to the backsheet 26 by attachment means (not shown) such as those well known in the art. Suitable attachment means are described with respect to joining the backsheet 26 to the absorbent core 28. In a preferred embodiment of the present invention, the topsheet 24 and the backsheet 26 are joined directly to each other in the diaper periphery and are indirectly joined together by directly joining them to the absorbent core 28 by any suitable attachment means.

The topsheet 24 is preferably compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet 24 is preferably liquid pervious



permitting liquids (e.g., urine) to readily penetrate through its thickness. A suitable topsheet 24 may be manufactured from a wide range of materials such as woven and nonwoven materials; polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films; porous foams; reticulated foams; reticulated thermoplastic films; and thermoplastic scrims. Suitable woven and nonwoven materials can be comprised of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polymeric fibers such as polyester, polypropylene, or polyethylene fibers) or from a combination of natural and synthetic fibers.

The topsheet 24 is preferably made of a hydrophobic material to isolate the wearer's skin from liquids which have passed through the topsheet 24 and are contained in the absorbent core 28 (i.e. to prevent rewet). If the topsheet 24 is made of a hydrophobic material, at least the upper surface of the topsheet 24 is treated to be hydrophilic so that liquids will transfer through the topsheet more rapidly. This diminishes the likelihood that body exudates will flow off the topsheet 24 rather than being drawn through the topsheet 24 and being absorbed by the absorbent core 28. The topsheet 24 can be rendered hydrophilic by treating it with a surfactant. Suitable methods for treating the topsheet 24 with a surfactant include spraying the topsheet 24 material with the surfactant and immersing the material into the surfactant. A more detailed discussion of such a treatment and hydrophilicity is contained in U.S. Patents 4,988,344 entitled "Absorbent Articles with Multiple Layer Absorbent Layers" issued to Reising, et al on January 29, 1991 and U.S. Patent 4,988,345 entitled "Absorbent Articles with Rapid Acquiring Absorbent Cores" issued to Reising on January 29, 1991.

An alternative preferred topsheet comprises an apertured formed film. Apertured formed films are preferred for the topsheet because they are pervious to body exudates and yet non-absorbent and have a reduced tendency to allow liquids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film which is in contact with the body remains dry, thereby reducing body soiling and creating a more comfortable feel for the wearer. Suitable formed films are described in U.S. Patent 3,929,135, entitled "Absorptive Structures Having Tapered Capillaries", which issued to Thompson on December 30, 1975; U.S. Patent 4,324,246 entitled "Disposable Absorbent Article Having A Stain Resistant Topsheet", which issued to Mullane, et al. on

April 13, 1982; U.S. Patent 4,342,314 entitled "Resilient Plastic Web Exhibiting Fiber-Like Properties", which issued to Radel. et al. on August 3, 1982; U.S. Patent 4,463,045 entitled "Macroscopically Expanded Three-Dimensional Plastic Web Exhibiting Non-Glossy Visible Surface and Cloth-Like Tactile Impression", which issued to Ahr et al. on July 31, 1984; and U.S. 5,006,394 "Multilayer Polymeric Film" issued to Baird on April 9, 1991.

The diaper 20 preferably further comprises elasticized barrier leg cuffs 32 positioned adjacent to the longitudinal edges 25 of the containment assembly. The barrier leg cuffs 32 provide improved containment of liquids and other body exudates. Each barrier leg cuff 32 may comprise any of several different embodiments for reducing the leakage of body exudates in the leg regions. (The barrier leg cuff 32 is sometimes also referred to as leg bands, side flaps, elasticized leg cuffs, or elastic cuffs.) Non-limiting examples of embodiments for barrier leg cuffs herein are described in the following U.S. patents. U.S. Patent 3,860,003 describes a disposable diaper which provides a contractible leg opening having a side flap and one or more elastic members to provide an elasticized leg cuff (gasketing cuff). U.S. Patent 4,909,803 entitled "Disposable Absorbent Article Having Elasticized Flaps" issued to Aziz et al. on March 20, 1990, describes a disposable diaper having "stand-up" elasticized flaps (barrier cuffs) to improve the containment of the leg regions. U.S. Patent 4,695,278 entitled "Absorbent Article Having Dual Cuffs" issued to Lawson on September 22, 1987, describes a disposable diaper having dual cuffs including a gasketing cuff and a barrier cuff. U.S. Patent 4,795,454 entitled "Absorbent Article Having Leakage Resistant Dual Cuffs" issued to Dragoo on January 3, 1989 describes leakage resistant cuffs. U.S. Patent 4,704,115 entitled "Disposable Waste Containment Garment" issued to Buell on November 3, 1987, discloses a disposable diaper or incontinence garment having side-edge-leakage-guard gutters configured to contain free liquids within the garment.

Each barrier leg cuff 32 has a proximal edge 33 joined with the containment assembly 22, a distal edge 35, and a spacing means 77 such as a spacing elastic member 77 for spacing the distal edge 35 away from the liquid receiving surface (topsheet 24) of the containment assembly 22. The proximal edge 33 of the barrier leg cuff 32 is preferably inboard of the gasketing cuff 63, preferably between the longitudinal edge 60 of the core 28 and the flap elastic members 65 by adjoining a segment of the barrier leg cuff to the backsheet 26 by

a seal means (not separately shown) such as an adhesive bead so as to form a leakage resistant seal along the proximal edge 33 to present a barrier to liquid wicking through the topsheet 24 so as to prevent the liquids from wicking underneath the barrier cuffs 32 to the edges of the diaper 20.

5        The rear ear panels 30 extend laterally outwardly from the longitudinal edges 25 of the containment assembly 22 in the rear waist region 44. Similarly, the front ear panels extend laterally outwardly from the longitudinal edges 25 of the containment assembly 22 in the front waist region 46. Preferably, the rear ear panels 30 and the front ear panels 31 are extensions of the barrier leg cuffs 32 and extend laterally outwardly from the proximal edges 33 of the barrier leg cuffs 32. The absorbent articles herein preferably contain at least rear ear panels 30.

15        The backsheet 26 of the present invention comprises a plastic film having an outer-facing surface and a body-facing surface, and may further comprise a nonwoven web (not shown) joined with the outer-facing surface of the plastic film to form a laminate. The nonwoven web may be joined to the plastic film by any suitable attachment means known in the art. For example, the nonwoven web may be secured to the plastic film by a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. Suitable adhesives include a hotmelt adhesive obtainable from Nitta Findley Co., Ltd., Osaka, Japan as H-2476-01, and a hotmelt adhesive obtainable from H.B. Fuller Japan Co., Ltd., Osaka, Japan as JM-6064. Preferably, the density of the adhesive applied between the nonwoven web and the plastic film is from about 0.05 g/m<sup>2</sup> to about 7.0 g/m<sup>2</sup>, more preferably from about 0.1 g/m<sup>2</sup> to about 5.0 g/m<sup>2</sup>, most preferably from about 0.2 g/m<sup>2</sup> to about 1.5 g/m<sup>2</sup>.

20        The plastic film is preferably impervious to liquids (e.g., urine) and is preferably manufactured from a thin plastic film. However, the plastic film permits vapors to escape from the diaper 20. In a preferred embodiment, a microporous polyethylene film is used for the plastic film. A suitable microporous polyethylene film is manufactured by Mitsui Toatsu Chemicals, Inc., Nagoya, Japan and marketed in the trade as Espoir.

30        A suitable material for the plastic film is a thermoplastic film having a thickness of from about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils), preferably comprising polyethylene or polypropylene. Preferably, the plastic film

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has a basis weight of from about 5 g/m<sup>2</sup> to about 35 g/m<sup>2</sup>. However, it should be noted that other flexible liquid impervious materials may be used. As used herein, the term "flexible" refers to materials which are compliant and which will readily conform to the general shape and contours of the wearer's body. In preferred embodiments, the backsheet 26 of the present invention may comprise a single member such as the film described above, or may comprise a number of materials joined together to form the backsheet plastic film.

The nonwoven web may cover all or substantially all of the outer-facing surface of the plastic film, or may cover only discrete predetermined portions. In a preferred embodiment, the plastic film exists only in the containment assembly area 22 (and does not exist the ear panel areas 30, 31), while the nonwoven web exists the both of the containment assembly area 22 and the ear panel areas 30. Also preferred are embodiments in which the nonwoven web exists only in the ear panel areas 30, 31 and does not substantially overlap the containment area 22. The nonwoven web is preferably air pervious. An especially preferred nonwoven web is a spunbonded nonwoven web, preferably made of bi-component fibers.

The backsheet 26 is preferably positioned adjacent the outer surface of the absorbent core 28 and is preferably joined thereto by any suitable attachment means known in the art. For example, the backsheet 26 may be secured to the absorbent core 28 by a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. Adhesives which have been found to be satisfactory are manufactured by H. B. Fuller Company of St. Paul, Minnesota and marketed as HL-1258. An example of a suitable attachment means comprising an open pattern network of filaments of adhesive is disclosed in U.S. Patent 4,573,986 entitled "Disposable Waste-Containment Garment", which issued to Minetola et al. on March 4, 1986. Another suitable attachment means comprising several lines of adhesive filaments swirled into a spiral pattern is illustrated by the apparatus and methods shown in U.S. Patent 3,911,173 issued to Sprague, Jr. on October 7, 1975; U.S. Patent 4,785,996 issued to Ziecker, et al. on November 22, 1978; and U.S. Patent 4,842,666 issued to Werenicz on June 27, 1989. Alternatively, the attachment means may comprise heat bonds, pressure bonds, ultrasonic bonds, dynamic mechanical bonds, or any other suitable attachment means or combinations of these attachment means as are known in the art.

Embodiments of the present invention are also contemplated wherein the absorbent core is not joined to the backsheet 26, and/or the topsheet 24 in order to provide greater extensibility in the front waist region 46 and the rear waist region 44. Alternative embodiments are contemplated wherein an additional member, such as a liquid impervious barrier material(s) (not shown), is positioned between the absorbent core 28 and the backsheet 28. Any such barrier member may or may not be joined to the absorbent core 28. Further, the backsheet 26 may or may not be joined to any barrier material(s) that are positioned between the backsheet 26 and the absorbent core 28.

The fastening system 36 of the present invention will be described in greater detail with reference to Figs. 2 and 3. Figs. 2a-c are enlarged views of portion of the fastening system of a conventional diaper. In Fig. 2a, the conventional fastening tape 100 is shown in its closed position, folded upon itself. In Figs. 2b and 2c, two types of conventional fastening tapes 100 are shown in their open positions, ready to be adhered to the outer facing surface of the front region 46 of the diaper, or to a landing member provided in the front region 46.

Although the conventional tape 100 shown in Fig. 2b is typically a unitary piece of material, it is generally comprised of various regions. The conventional tape shown in Fig. 2b uses a roughened region 120 that mates with a landing member (not shown) to hold the diaper in place during the period of wear. When the diaper having this conventional fastening system is not in use, the fastening tape 100 is folded to a closed position and lies flat against the body-facing surface of the rear ear panel 30, as shown in Fig. 2a. The tape 100 is held in this closed position by the adhesive region 130, which contacts the release surface region 140 of the tab 100. In this state the roughened region 120 that will contact the landing member (not shown) to hold the diaper in place during wear is not exposed but is facing the release surface 140 of the tape 100.

Thus, when it is desired to use (i.e., a wearer to wear) the diaper, the fastening tape 100 must be extended away from the surface of the rear ear panel 30 of the diaper, generally in the direction of the arrow labeled A and shown in Fig. 2a. The outermost region 110 of the conventional tab 100 may be provided with a smooth surface which is grasped by the user and which does not adhere to the landing member. In this conventional system, the adhesive portion

130 is not needed to hold the diaper in place on the wearer; it only serves to hold the tab 100 closed when the diaper is not in use.

In other conventional tape-type articles, for example as shown in Fig. 2c, the adhesive 130 is actually used to secure the diaper in place during wear. In such articles, no roughened region is provided and the landing member is not mated to a roughened region. This type of conventional article can be particularly difficult and inconvenient to use and requires a certain degree of pulling force to release the adhesive surface 130 from its release surface 140. In addition, the adhesive 130 is subject to decreased sticking ability over time, e.g., if refastening occurs or if foreign matter accidentally adheres to it.

In both of the conventional configurations shown in Figs. 2b and 2c, when the tape 100 is opened and the adhesive portion 130 is exposed, accidental sticking of this adhesive portion 130 to portions of the diaper other than the landing member sometimes occurs. This is not only annoying and inconvenient for the caregiver, but it can also damage the diaper and may compromise its integrity by tearing the polymer, the plastic, and/or the nonwoven surfaces of the diaper backsheet.

In both of the conventional embodiments shown in Figs. 2b-c, the roughened region 120 and the adhesive region 130 exist at locations entirely distal to the portion 51 of the side edge 50 of the diaper's periphery once the fastener tape has been opened. Due to the required length, less precision in securing the tape to the diaper can result.

In addition, the problem of accidental tearing can pre-exist. During the manufacture of tape-type diapers, it sometimes happens that the adhesive portion of the tape, which is sticky, and the mated release portion of the tape, which is not sticky, are not correctly matched when folded to the closed, storage position (see Fig. 2a). This leaves a portion of the sticky surface of the tape exposed, which then tends to stick to the backsheet as the diapers are folded for packaging. Thus, when the consumer opens or unfolds the diaper product just prior to use, the tape tears the backsheet. This can occur no matter how much area is actually sticky and is highly unacceptable to consumers.

Thus, it is desirable to eliminate such an adhesive portion 130. A preferred embodiment of the present invention, in which the adhesive has been eliminated, is shown in Fig. 3. Fig. 3a shows the internal mechanical fastener 200 in its closed position, i.e., while the diaper is stored before use. In this

closed state, the rear ear panel 30 is folded inward upon itself, and the fastening surface 220 of the fastener 200 contacts the ear panel 30 to hold the ear panel 30 in this position. There is no need to fold the fastener 200 back upon itself, for example in a configuration such as is shown in Fig. 2a. This may provide more compact storage than the conventional designs.

When it is desired to use (i.e., a wearer to wear) the diaper, the fastener 200 is grasped at its extension region 210 and pulled away from the surface of the rear ear panel 30 of the diaper, generally in the direction of the arrow labeled B. The fastening surface 220 is then exposed and ready to be mated with the landing region 38 (not shown). At least one pair of fasteners 200 is secured to the rear ear panel 30. The term "pair" is used herein to include embodiments not only in which two separate and distinct securement members extending distally outward from each rear ear panel 30, see e.g., Figs. 1 and 4b, are provided, but also in which at least one securement member having plural fastening surfaces extending distally outward from each rear ear panel 30, see e.g., Fig. 4n, is provided.

Preferably, the fastening surface 220 and the landing region are of the mated hook and loop-type. For example, the refastenable system described in U.S. Patent No. 5,569,233, entitled "Multi-layer Female Component For Refastenable Fastening Device And Method Of Making Same", issued to Goulait on October 29, 1996, may advantageously be used herein.

In preferred embodiments of the present invention, an extension region 210 extends distally outward from portion 51 of the side edge 50 of the diaper periphery that exists in the ear panel region 30, as shown in Fig. 3. This extension region 210 provides greater ease of application for the caregiver or for the wearer of the diaper, since it is easy to grasp. Preferably, the surface of the extension region 210 is smooth, i.e., not the same as the fastening surface. This difference in feel between the extension region 210 and the fastening surface 210 provides convenience and ease of re-fastening the fastener 200 on the landing member. The extension region 210, not being mated to the landing member, will not stick to the landing member. This provides a convenient starting place from which to pull the fastener 200 away from the landing member, without having to scrape up an edge of the fastener 200 to start the pulling process. In addition, the extension region 210 may desirably be made to have an increased thickness, which in turn makes it stiffer and easier to grasp.

Perferably, only the extension region 210 is distal to the side edge 50 of the diaper. The outer edge 222 of the fastening surface 220 is preferably approximately flush with the side edge 51 of the diaper; thus, it is "internal" in relation to the side edge. The comparison between the internal configuration of the fastening surface 220 of the preferred embodiments of the present invention and the locations of the adherent surfaces 120 or 130 of conventional diapers may be easily seen from a comparison of Fig. 3 to Figs. 2b-c. This configuration generally provides more stable and secure closure, more precise location of the fasteners to the landing member, and easier application than the conventional fasteners shown in Fig. 2.

In other preferred embodiments, the outer edge 222 of the fastening surface 220 may partially extend beyond the side edge 51. However, the outer edge 222 of the fastening surface 220 preferably does not extend in its entirety beyond the side edge 51.

Preferably, the internal fastener 200 is provided with a carrier surface 230. The carrier surface 230 forms a base upon which the fastening surface 220 is secured. For ease of manufacture, the extension portion 210 and the carrier surface 230 are preferably unitary; alternatively, they may be distinct components. The carrier surface 230 may be adhered to the nonwoven ear material using conventional manufacturing techniques that are also usable in the manufacture of tape-type diapers. The mechanical fastening surface 220 is joined to the carrier surface 230; the combination may then be joined to the nonwoven ear material. Use of the carrier surface 230 may also desirably contribute to increasing the thickness of the extension region 210. The distalmost end 232 of carrier surface 230 can be doubled over and secured at the side edge 51 of the article, instead of extending to substantially overlap onto the outer facing surface of the ear 30. In other preferred embodiments, the distalmost end 232 of the carrier surface 230 can overlap onto the outer facing surface of the ear 30 while increasing the thickness of the extension region 210.

If the carrier surface 230 is not used, the mechanical fastening surface 220 must be joined directly to the nonwoven ear by a process that is suitable for use in the manufacture of tape-type diapers, for example via for example a heat bonding process.

Preferably the fastening surface 220 is of a color that is distinct from the color of the diaper for the convenience of the user. For example, since the film



and nonwoven components of diapers are usually a white color, use of a blue color for the fastening surface 220 is believed to be visually appealing.

As will be understood by those of skilled in the art, the configuration of the internal mechanical fasteners of the present invention are not limited to the embodiments shown in Fig. 3. Any configuration is possible, and some non-limiting examples of additional preferred embodiments are shown in Figs. 4a-o. In Figs. 4a-o, the fastening surface 220 is represented by the shaded areas.

The embodiments disclosed herein have many advantages. These advantages are particularly evident in diapers used for adult incontinents, in which two pairs of fasteners may be useful to provide more secure fit and comfort. For example, accidental sticking of the fastener 200 to areas other than the landing member can be avoided, eliminating torn backsheets and contributing to sustained diaper integrity and greater consumer satisfaction.

In addition, it is believed that application of the diaper is easier and more convenient. This is due to the "internal" design as well as the fact that there is no need to remove adhesive from release surfaces. The internal design is further believed to provide secure closure.

All cited references are incorporated herein by reference in their entireties. Citation of any reference is not an admission regarding any determination as to its availability as prior art to the claimed invention.

It is understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to one skilled in the art without departing from the scope of the present invention.

**WHAT IS CLAIMED IS:**

1. An absorbent article having a periphery, a longitudinal center line and a lateral centerline, comprising;
  - (a) a containment assembly having a rear waist region, a crotch region, a front waist region, a body facing surface and a garment facing surface opposite to the body facing surface, the containment assembly comprising a topsheet, a backsheet joined to the topsheet, an absorbent core positioned between the topsheet and the backsheet;
  - (b) a pair of rear ear panels extending laterally outwardly from the longitudinal edges of the containment assembly in the rear waist region;
  - 10 (c) at least one pair of fasteners secured to the rear ear panels, the fasteners being free from adhesive; and
  - (d) a landing region located on the outer facing surface of the article in the front waist region of the article, the fasteners being secured to the landing region when the article is worn.
2. The article of claim 1 wherein the fasteners are provided with a hook surface, and the landing region is mated to engage the hook surface of the fasteners.
3. The article of claim 2 wherein the fasteners are provided with extension regions that extend more distally than a side region of the diaper periphery in the rear ear panel area.
4. The article of claim 3 wherein the hook surface is internal to the side region of the diaper periphery.
5. The article of claim 3 wherein each of the fasteners has a fastening surface joined to a carrier tape, the carrier tape being joined to the rear ear panels.
6. The article of claim 4 wherein the carrier tape and the extension region are unitary.

7. The article of claim 4 further comprising a pair of front ear panels.
8. The article of claim 6 wherein the extension region does not substantially overlap onto the garment facing surface of the rear ear panels.
9. The article of claim 8 wherein the extension region is of increased thickness.

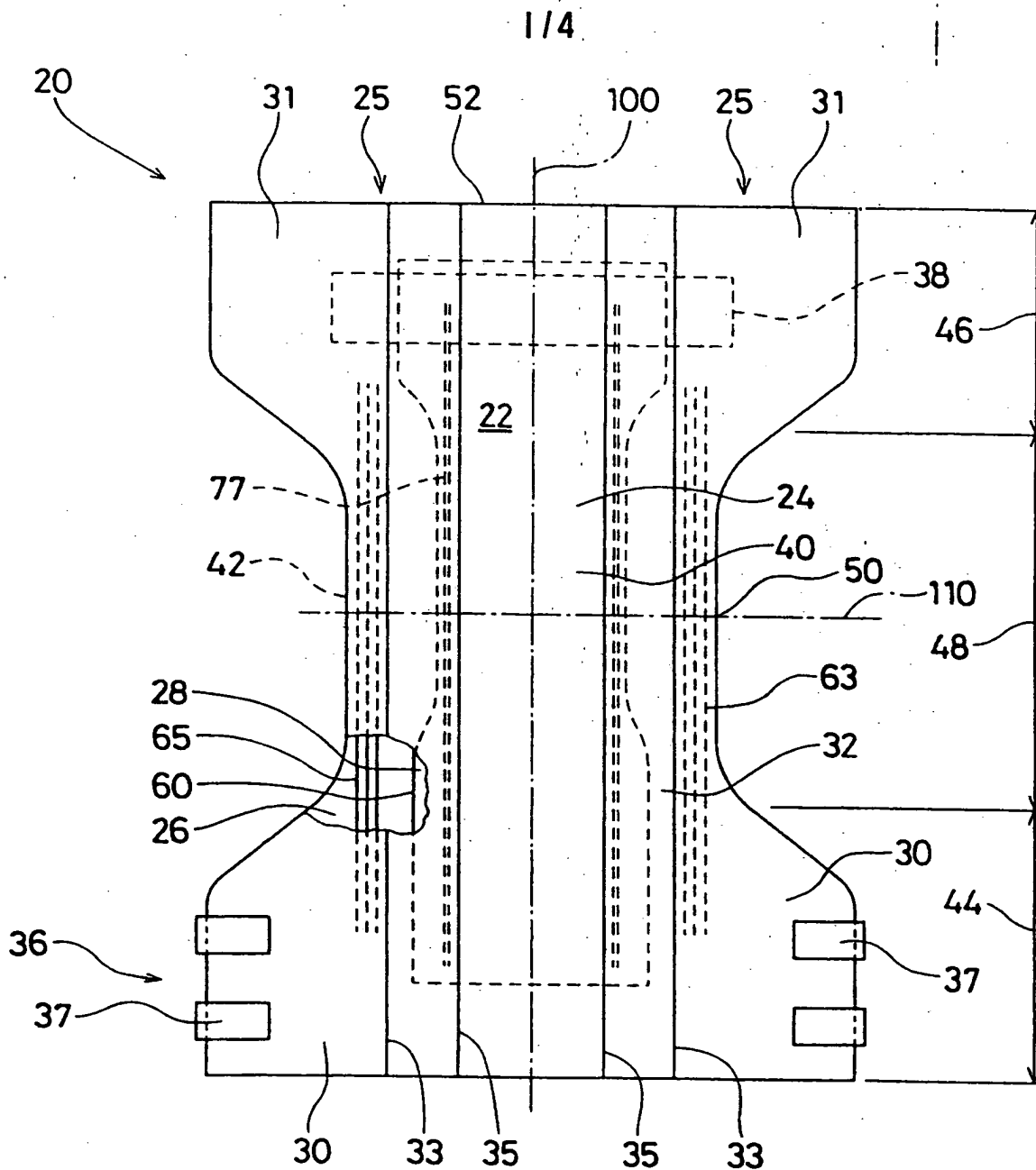


Fig. 1

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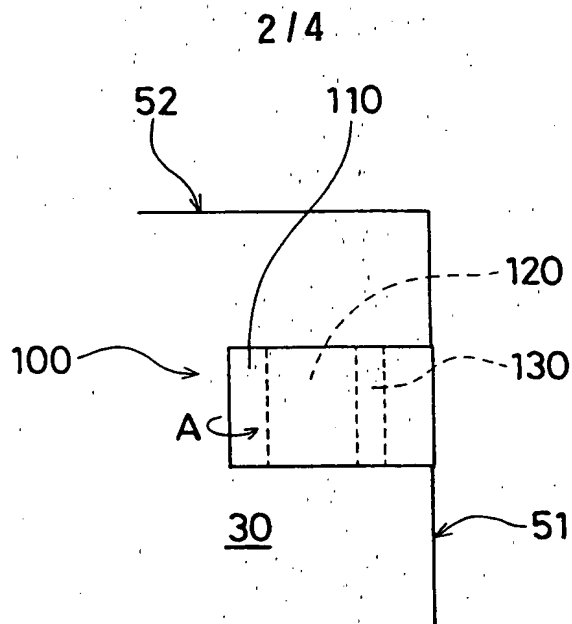


Fig. 2a

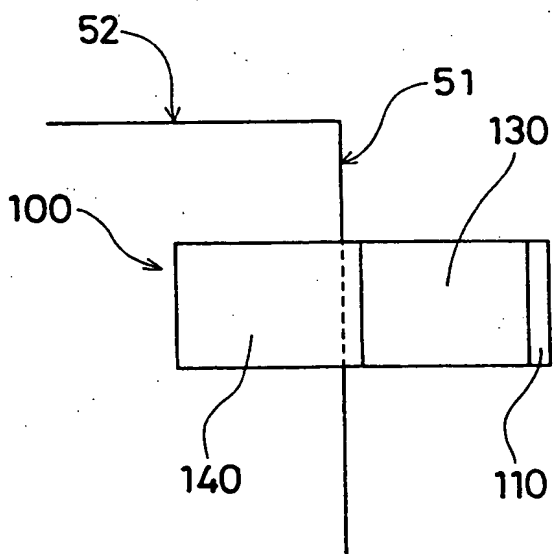


Fig. 2c  
PRIOR ART

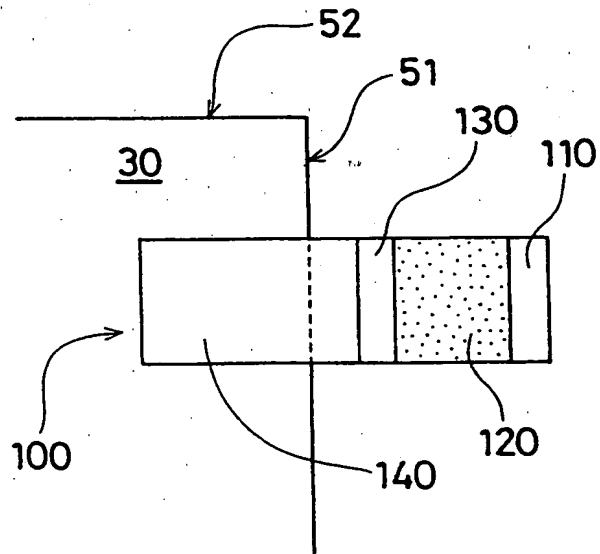


Fig. 2b  
PRIOR ART

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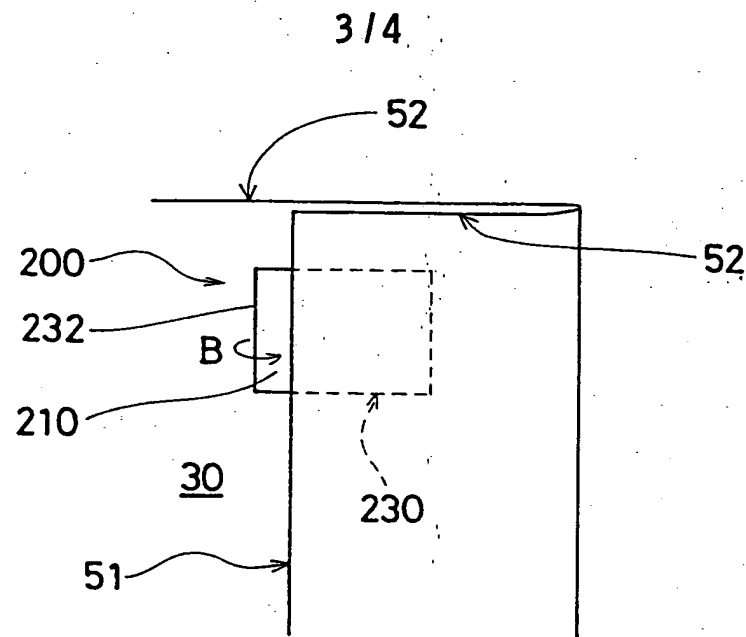


FIG. 3a

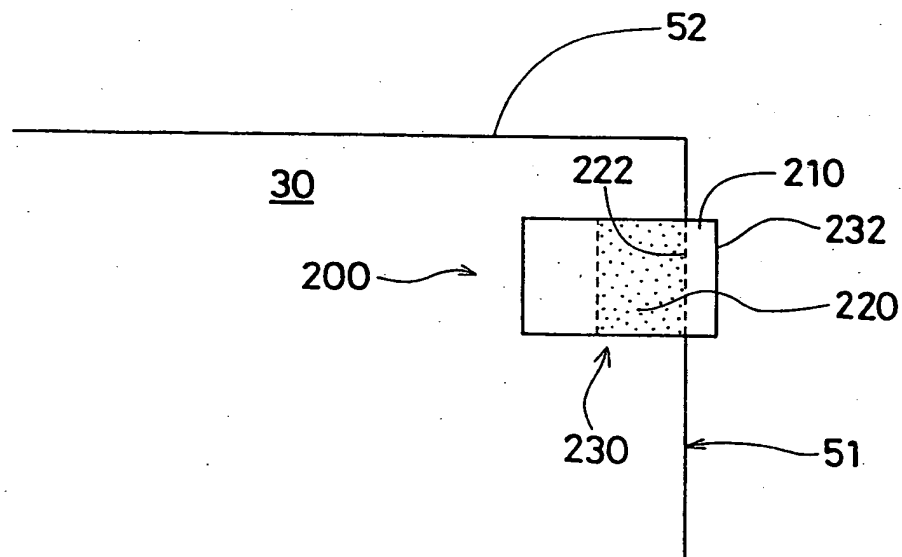


Fig. 3b

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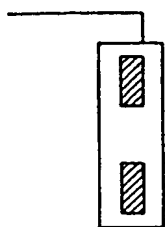


FIG. 4a

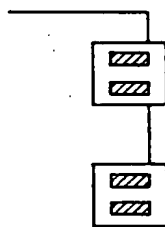


FIG. 4b

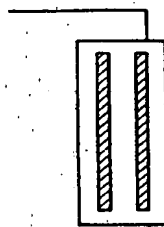


FIG. 4c

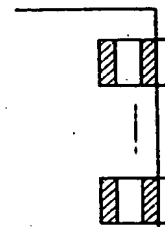


FIG. 4d

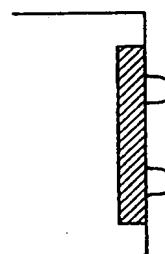


FIG. 4e

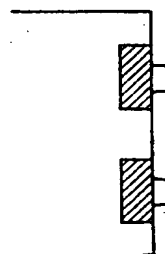


FIG. 4f

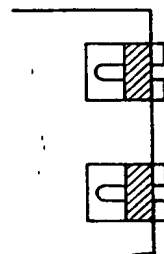


FIG. 4g

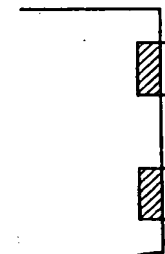


FIG. 4h

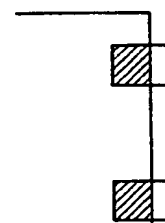


FIG. 4i

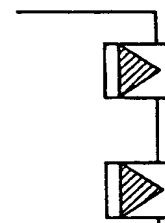


FIG. 4j

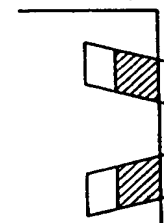


FIG. 4k

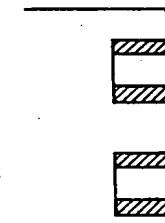


FIG. 4l

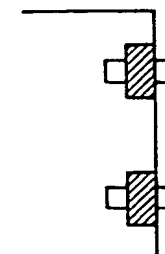


FIG. 4m

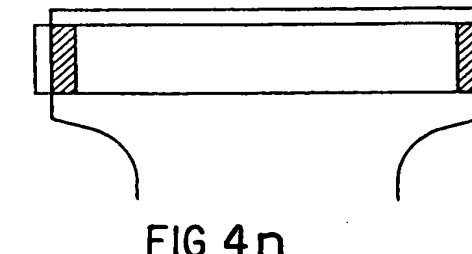


FIG. 4n

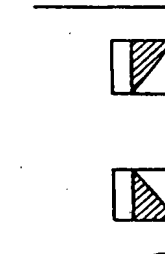


FIG. 4o

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International Application No  
PCT/US 98/08201

According to International Patent Classification (IPC) or to both national classification and IPC

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 4 937 887 A (SCHREINER DAVID N) 3 July 1990 see the whole document	1-6, 8
X	EP 0 768 075 A (UNI CHARM CORP) 16 April 1997 see the whole document	1, 2
X	US 5 660 666 A (EHLERT THOMAS DAVID ET AL) 26 August 1997 see claims; figures	1-3, 5
A		4, 6-9

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**Y** Patent family members are listed in annex.

\*8\* document member of the same patent family

Date of mailing of the international search report

11/02/1999

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Douskas, K



# INTERNATIONAL SEARCH REPORT

International Application No  
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